

PALOMAR ENERGY PROJECT (01-AFC-24)
CEC STAFF DATA REQUEST NUMBER 15

Technical Area: Air Quality

Response Date: April 8, 2002

REQUEST:

Please discuss the project's contribution to the formation of ozone or secondary PM₁₀ as a result of NO_x, VOC, and SO_x emissions and identify a strategy to mitigate ozone and secondary PM₁₀ impacts from these precursors.

RESPONSE:

The San Diego County Air Pollution Control District ("SDAPCD" or "District") is the primary agency tasked with attaining and maintaining the ambient air quality standards (AAQS) within its borders. With regard to ozone, the SDAPCD compiles an emissions inventory for attainment planning purposes, and then evaluates the effectiveness of various pollution control strategies. Projects can reasonably rely on the New Source Review (NSR) provisions developed by the District in compliance with State and Federal Laws to ensure that sufficient offsets and mitigations have been provided for new sources of emissions. The NSR rules are developed through a complex planning process, with oversight from the California Air Resources Board ("ARB") and the U. S. EPA, to ensure that they are sufficient to meet regional attainment goals and requirements.

This planning process requires periodic reviews to ensure that the program is adequate. In August 2001, the SDAPCD released "The San Diego Air Basin 2001 Triennial Regional Air Quality Study Revision." This report was prepared in accordance with State Law and specifically addressed whether the emissions mitigation program required by the SDAPCD's NSR rules was adequate to meet the District's goals for attaining the California Ozone AAQS. ARB guidance concerning this triennial review is to ensure that there is no halt or reversal of an existing trend of decreasing total regionwide emissions (SDAPCD 2001). The 2001 report concludes that the District's NSR program is adequate. In fact, between 1997 and 2000 emission reductions exceeded previous projections. Regional daily volatile organic compounds ("VOC") decreased by 3.1% annually versus a projected 2.0% reduction. Regional daily NO_x emissions decreased by 2.7% versus a projected 2.0% reduction. (SDAPCD 2001).

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Since San Diego County is an attainment area for NO₂ AAQS, the offset requirements under the District's NSR rule are primarily for the purpose of ozone mitigation. The offset trigger levels, intrapollutant and interpollutant trading ratios have been set at levels that have been deemed sufficient by the State and Federal agencies, as well as the SDAPCD, to not only mitigate new source emissions but to also provide a net air quality benefit. As allowed under NSR rules, Palomar will provide a combination of NO_x and VOC credits at significantly more than a one to one ratio of the total emissions of these two pollutants in order to meet the District's offset requirements; therefore, meeting these requirements should be considered sufficient mitigation with respect to the ozone AAQS. We note that under the CEQA Guidelines, sec. 15064(i)(2), a lead agency may determine that a project's contribution to a cumulative effect is not cumulatively considerable if the project will comply with a previously approved mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem, such as an air quality plan.

With respect to PM₁₀ precursor emissions, NO_x and SO_x are considered the primary precursors. The discussion below provides an assessment of the formation of secondary PM₁₀ as a result of the Palomar emissions.

As stated in the Final Staff Assessment for the Otay Mesa Generating Project (CEC, 2000), currently there is no agency-recommended air quality model for predicting secondary sulfate or nitrate formation. However, potential contributions of gaseous nitrogen oxides (NO_x) and sulfur dioxide (SO₂) emissions to particulate nitrate and sulfate can be assessed using measured ambient nitrate and sulfate concentrations in conjunction with estimated basin-wide NO_x and SO₂ emissions. If the secondary nitrate and sulfate concentrations are assumed to be linearly proportional to emissions, then the ratio of the measured concentrations to the emissions is a measure of the potential for additional emissions to form secondary PM₁₀.

The California Air Resources Board (ARB) analyzes 24-hour PM₁₀ samples collected at the Chula Vista, El Cajon and Logan Avenue monitoring stations for nitrate and sulfate. However, these samples are collected on micro-quartz fiber filters using a size-selective high-volume PM₁₀ sampler. This sampling technique can introduce errors in the nitrate

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and sulfate measurements. Collected ammonium nitrate can volatile and be lost from the filter, leading to underestimation of the concentration. Sulfur dioxide may also be collected on the filter medium, leading to over-estimation of sulfate concentrations. Therefore, these data were not used.

Instead, data from the South Coast Air Quality Management District's PM₁₀ Technical Enhancement Program (PTEP), presented in the 1997 South Coast Air Quality Management Plan (AQMP, SCAQMD, 1996) were used for this analysis. Relationships between NO_x and SO₂ emissions and resulting secondary nitrate and sulfate concentrations are probably different in the South Coast Air Basin than in the San Diego Air Basin. However, because of the higher photochemical reactivity of the atmosphere in the South Coast Air Basin, as indicated by substantially higher ozone concentrations, the extent of conversion of emissions to secondary PM₁₀ is probably greater there.

The SCAQMD chemically analyzed samples from five locations collected during 1995 in the South Coast Air Basin. The samplers employed configurations and filter media that avoided the potential errors associated with the size-selective high-volume sampling. The SCAQMD used chemical mass balance (CMB) receptor modeling to estimate source category contributions to annual average and maximum 24-hour average PM₁₀ concentrations. The resulting estimated secondary ammonium nitrate and ammonium sulfate concentrations are listed for each site in Table 15-1.

Table 15-1
Annual-Average and 24-Hour Maximum CMB Estimates of Secondary
Ammonium Nitrate and Ammonium Sulfate Concentrations
from the SCAQMD PTEP During 1995

Site	Ammonium Nitrate		Ammonium Sulfate	
	Average (µg/m ³)	Maximum (µg/m ³)	Average (µg/m ³)	Maximum (µg/m ³)
Central Los Angeles	12.6	92.2	5.5	17.0
Anaheim	12.9	90.4	4.9	7.9
Diamond Bar	14.9	86.4	4.9	15.3
Fontana	18.3	72.5	4.5	5.3
Rubidoux	22.8	102.4	5.3	9.6
Highest	22.8	102.4	5.5	17.0
Source: SCAQMD 1997 Air Quality Management Plan, Appendix V, Tables 2-15 and 2-16				

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The SCAQMD also estimated NO_x and SO₂ emissions during 1995 for the AQMP. Annual-average daily emissions are listed in Table 15-2, as well as the highest annual average and 24-hour average ammonium sulfate and ammonium nitrate concentrations measured at the PTEP sites, along with the ratios of the concentrations to the emissions. The listed ratios, in µg/m³ per ton/day, serve as an estimate of the concentrations of secondary ammonium nitrate and ammonium sulfate resulting from the NO_x and SO₂ emissions, respectively.

Table 15-2
Highest Annual-Average 24-Hour Maximum CMB Estimates of Secondary
Ammonium Nitrate and Ammonium Sulfate Concentrations
from the SCAQMD PTEP and Annual-Average Daily Emissions During 1995

	Ammonium Nitrate		Ammonium Sulfate	
	Average	Maximum	Average	Maximum
Highest Concentration (µg/m ³)	22.8	102.4	5.5	17.0
Annual-Average Daily Precursor Emissions (tons/day) ^a	1,158.6		83.9	
Ratio of Concentration to Precursor Emissions (µg/m ³ per ton/day)	0.0197	0.0884	0.0656	0.203

^a From SCAQMD 1997 Air Quality Management Plan, Appendix V, Table 2-8

The resulting estimates of secondary ammonium nitrate and ammonium sulfate concentrations estimated by applying the ratios in Table 15-2 to anticipated emissions from the Palomar project are listed in Table 15-3. As seen in the table, the estimated annual-average and 24-hour maximum secondary ammonium nitrate concentrations are 0.0067 and 0.035 µg/m³, respectively, and annual-average and 24-hour maximum ammonium sulfate concentrations are 0.0059 and 0.022 µg/m³, respectively. The sums of annual-average and maximum 24-hour average secondary nitrate and sulfate impacts are 0.013 and 0.057 µg/m³, respectively. These values are only 0.04 percent and 0.03 percent of the corresponding annual-average and 24-hour average California PM₁₀ Ambient Air Quality Standards. Therefore, the estimated contribution to secondary PM₁₀ from the project's NO_x and SO₂ emissions is negligible. Furthermore, the (ARB) reports annual average and 24-hour average PM₁₀ concentrations to the

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nearest 0.1 and 1 $\mu\text{g}/\text{m}^3$, (e.g., <http://www.arb.ca.gov/aqd/pm10/A2S2589.htm>). The estimated contributions of the project to secondary PM_{10} concentrations are less than one-tenth of the concentration increases that would be reported

Table 15-3
Annual and Maximum Daily NO_x and SO_2 Emissions and Estimated Secondary
Ammonium Nitrate and Ammonium Sulfate Concentrations
from the Palomar Energy Project

	Ammonium Nitrate		Ammonium Sulfate	
	Average	Maximum	Average	Maximum
Palomar Energy Project Precursor Emissions (tons/day) ^a	0.340	0.398	0.0904	0.108
Ratio of Concentration to Precursor Emissions ($\mu\text{g}/\text{m}^3$ per ton/day)	0.0197	0.0884	0.0656	0.203
Estimated Ambient Concentration ($\mu\text{g}/\text{m}^3$)	0.0067	0.035	0.0059	0.022
^a From AFC, Tables 5.2-11 (annual, tons/year divided by 365 days/year to estimate lbs/day) and 5.2-10 (daily maximum, lbs/day divided by 2,000 lbs/ton to estimate lbs/day)				

Because the estimated impacts on secondary PM_{10} concentrations are negligible, a strategy to mitigate secondary PM_{10} impacts from the project is not necessary.

- CEC, 2000, Final Staff Assessment for the Otay Mesa Generating Station (99-AFC-5)
- SCAQMD, 1996, Air Quality Management Plan
- SDAPCD, 2001, The San Diego Air Basin 2001 Triennial Regional Air Quality Study Revision